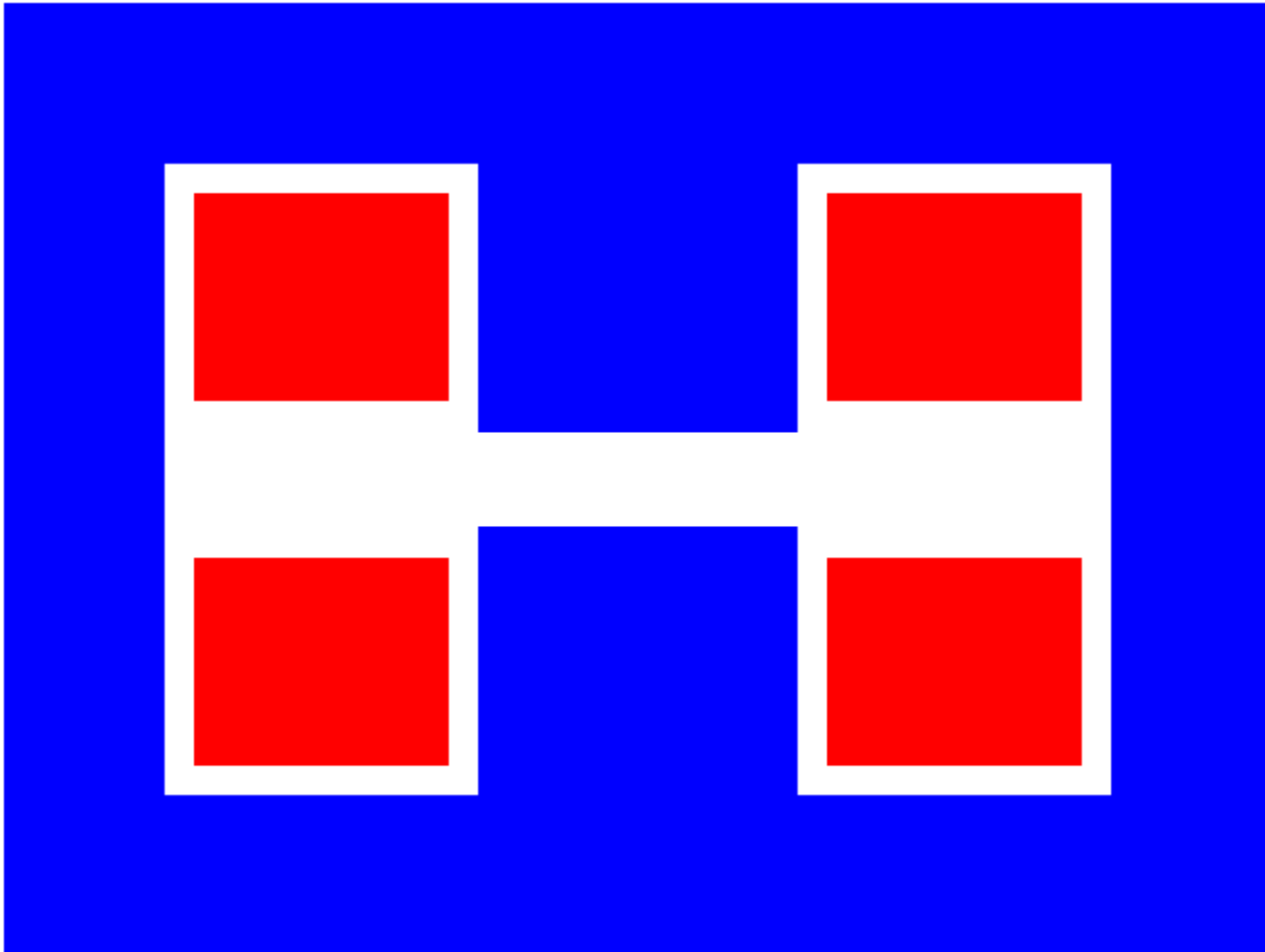


Finite Elements Simulations

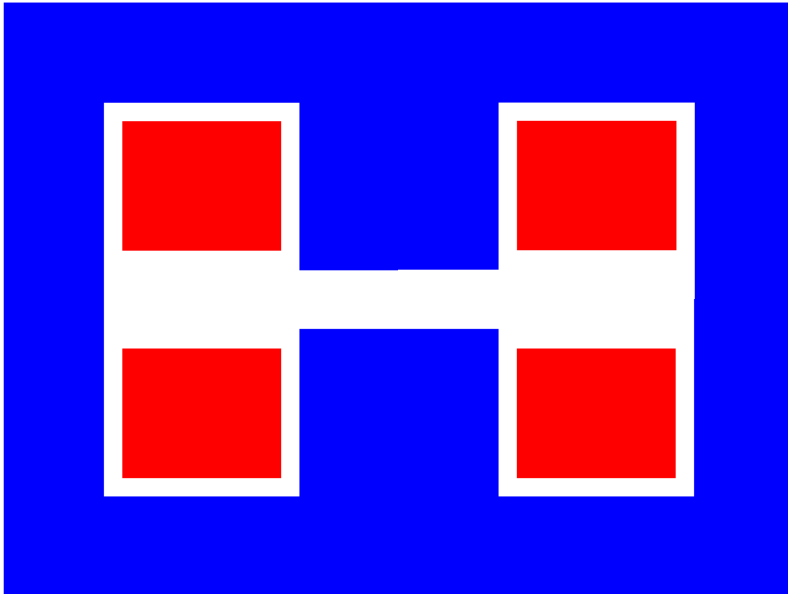
Mauricio Lopes – FNAL

Geometry



General guideline for FE models

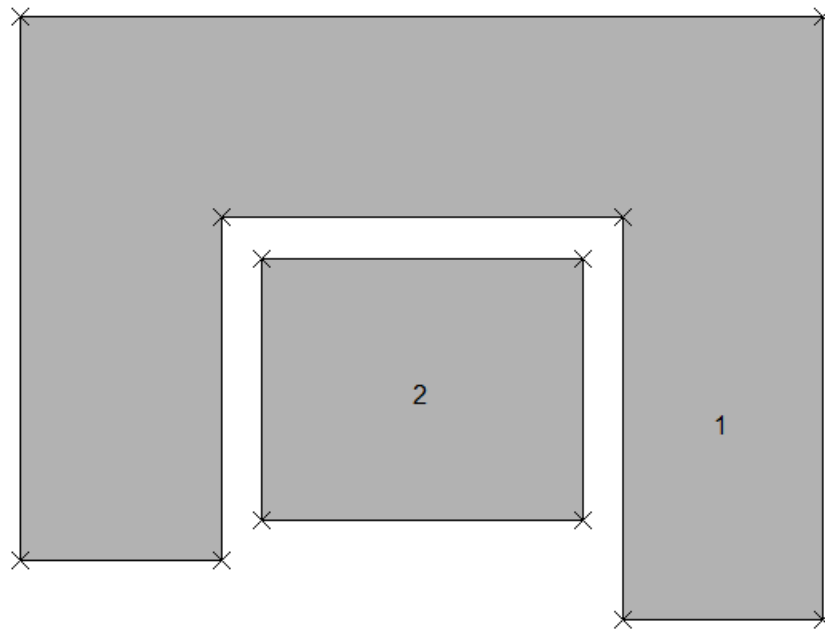
1) Reduce the model taking advantages of the symmetries



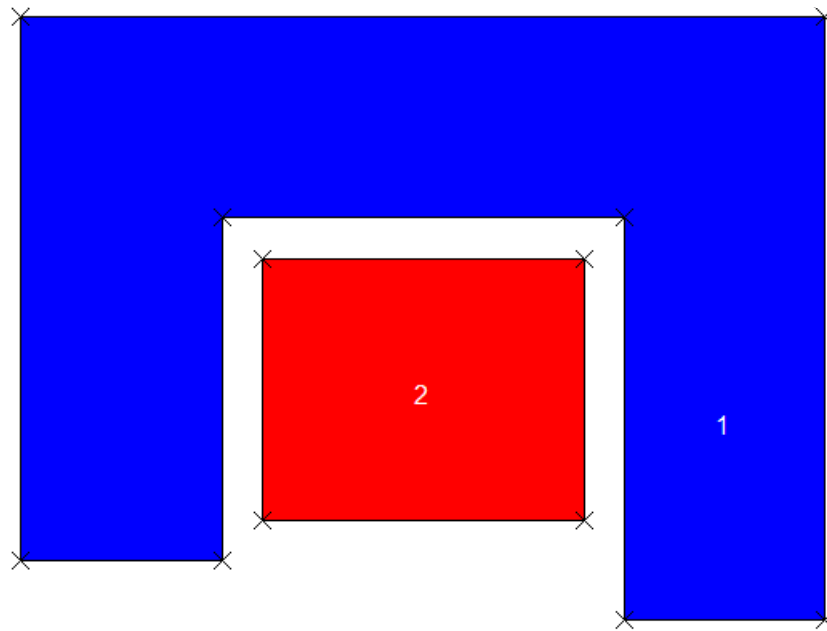
General guideline for FE models

1) Reduce the model taking advantages of the symmetries

2) Define geometry regions

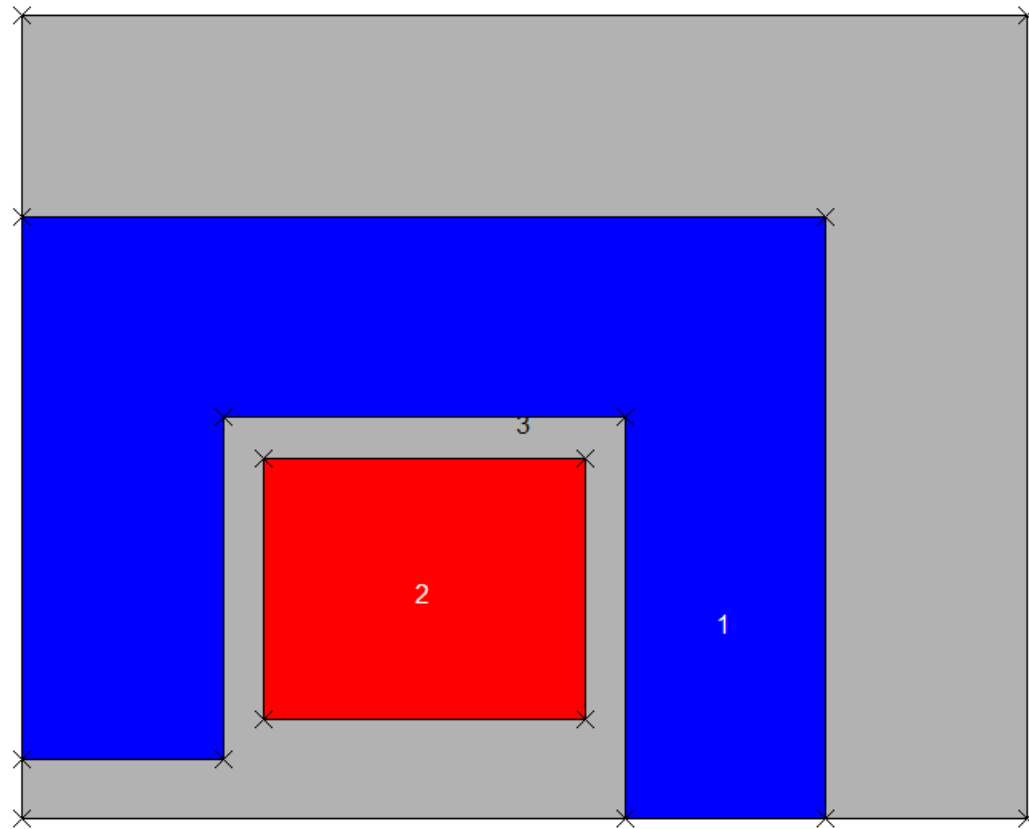


General guideline for FE models



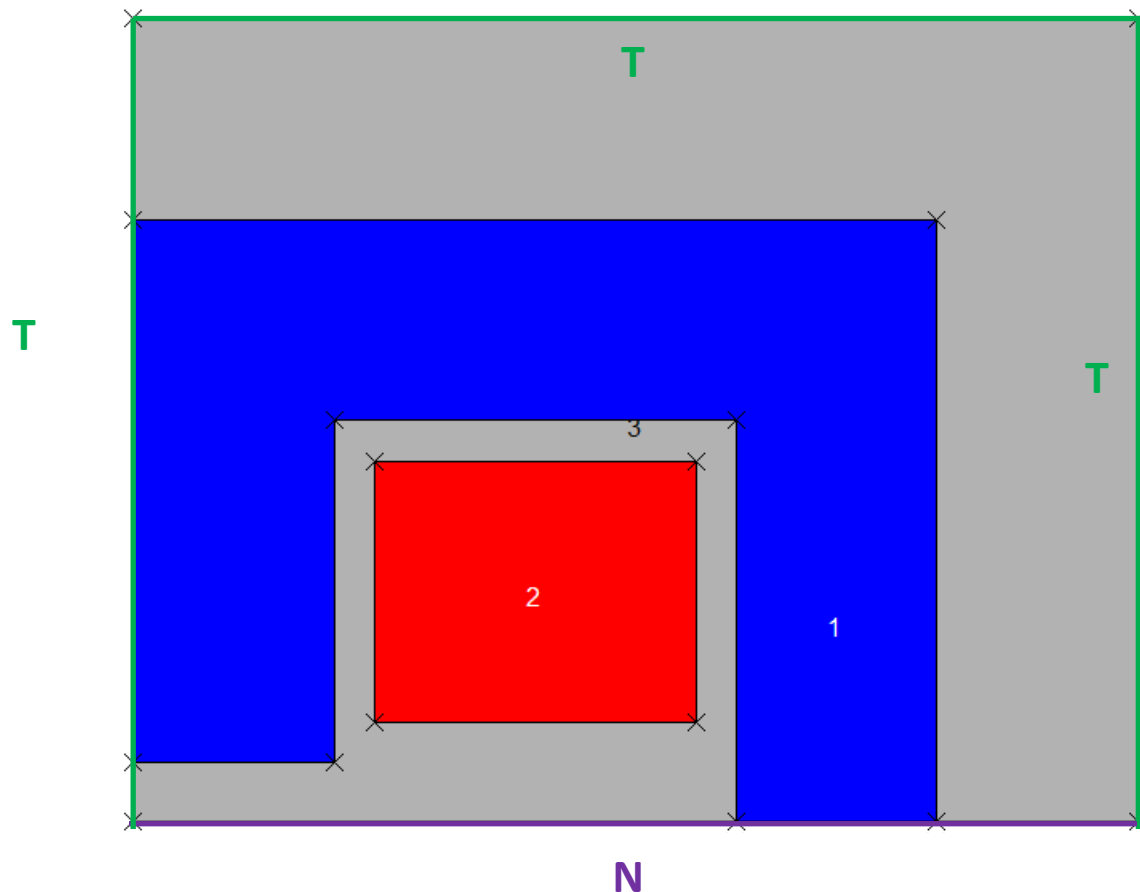
- 1) Reduce the model taking advantages of the symmetries
- 2) Define geometry regions
- 3) Define regions material properties

General guideline for FE models



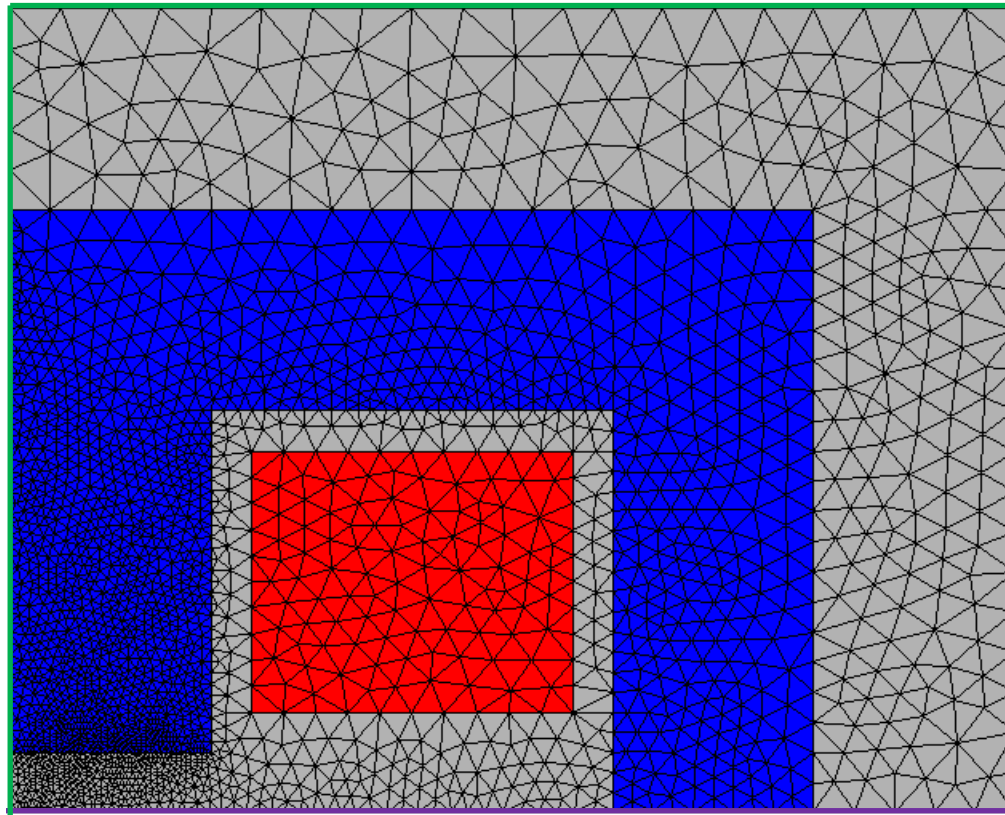
- 1) Reduce the model taking advantages of the symmetries
- 2) Define geometry regions
- 3) Define regions material properties
- 4) Define your “universe”

General guideline for FE models



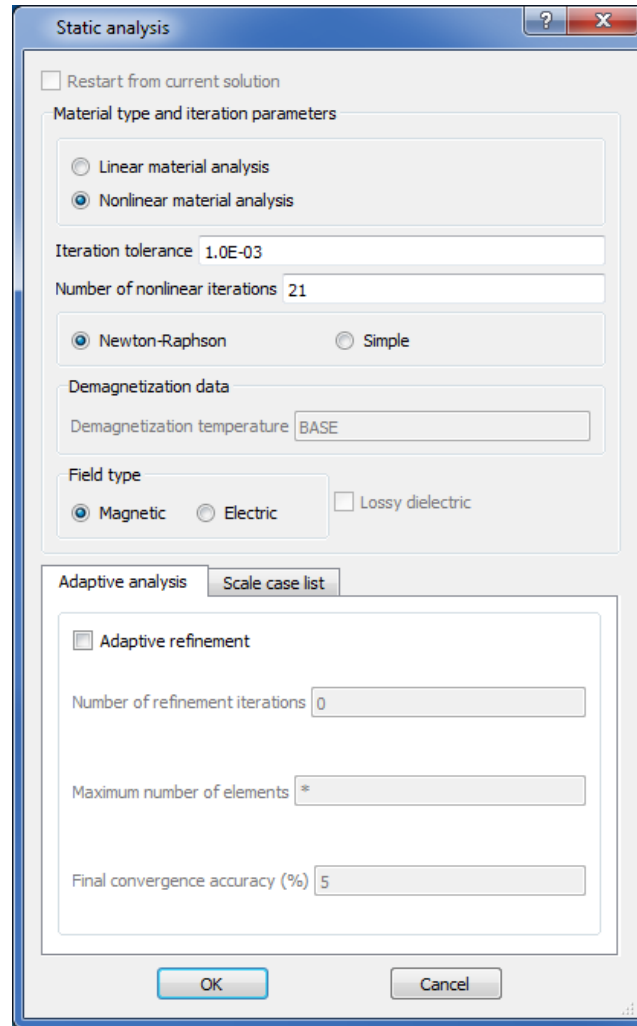
- 1) Reduce the model taking advantages of the symmetries
- 2) Define geometry regions
- 3) Define regions material properties
- 4) Define your "universe"
- 5) Define Boundary Conditions

General guideline for FE models



- 1) Reduce the model taking advantages of the symmetries
- 2) Define geometry regions
- 3) Define regions material properties
- 4) Define your “universe”
- 5) Define Boundary Conditions
- 6) Define/Refine mesh

General guideline for FE models



1) Reduce the model taking advantages of the symmetries

2) Define geometry regions

3) Define regions material properties

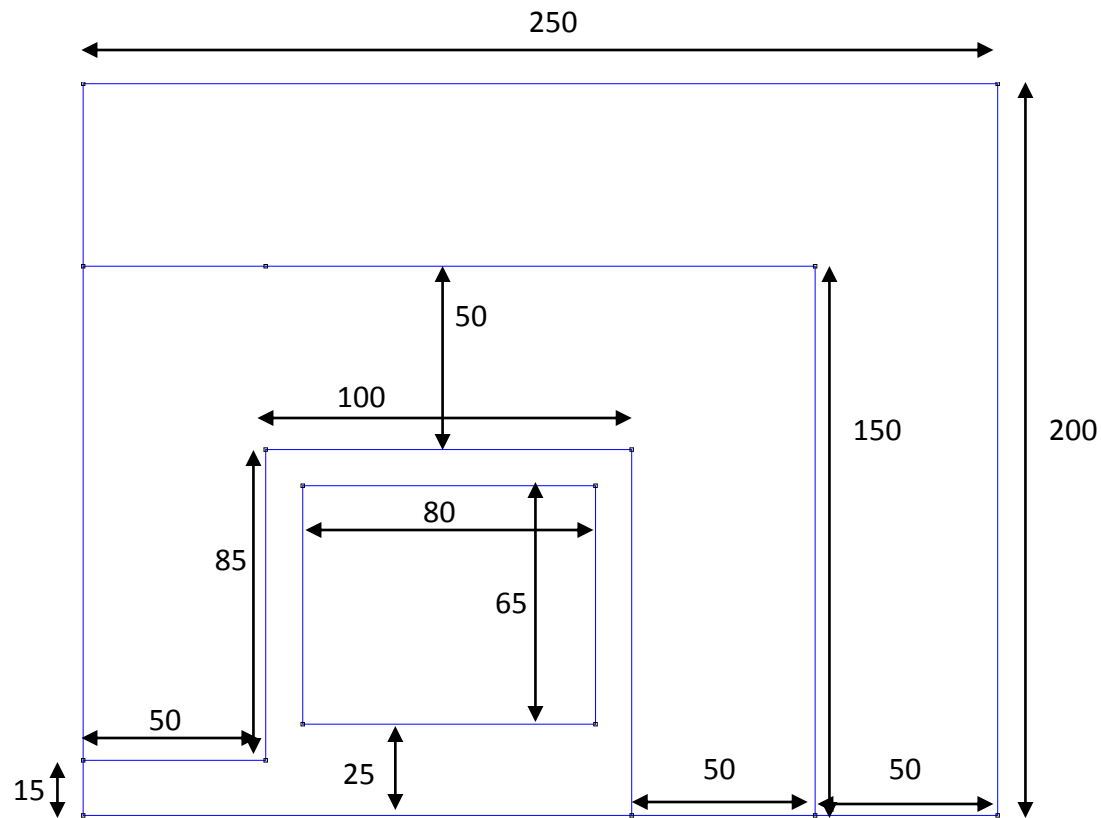
4) Define your “universe”

5) Define Boundary Conditions

6) Define/Refine mesh

7) Set simulations details (convergence criteria)

Hands-on Example



Tips

- Check your units. Be consistent with them.
- Check the boundary conditions.
- Check the polarity of your coils.
- Check the materials properties.
- Estimate the result and verify that it is correct.
- Optimize your mesh to refine the results.
- Simplify your model by removing unnecessary details.
- If the task involves repetitions with small variations, make use of scripts.
- Refer to Manual/Help File.